

Illustrated catalogue of cold water corals (Cnidaria: Anthozoa) from Alboran basin and North Eastern Atlantic submarine mountains, collected in Oceana campaigns

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ABSTRACT

Along the Oceana marine exploration trips (2011-2012) it has been collected 17 species of cold water corals (Cnidaria: Anthozoa) from deep Alboran basin and submarine mountains located South of Portugal. There are two new records from the Mediterranean and also an important found regarding the enigmatic *Dendrobrachia bonsai*. The paper is completed by some images with deep habitats information showing some of the studied species.

Key words: deep water corals, Alboran basin, Mediterranean, Ormonde and Gorrige seamount, South of Portugal.

RESUMEN

A lo largo de las campañas de exploración marina de Oceana (2011-2012) se han recogido 17 especies de corales (Cnidaria: Anthozoa) de aguas profundas (circalitorales y sobretudo batiales) de la región de Alborán y de las montañas submarinas (Ormonde y Gorrige) situadas al sur de Portugal. Hay dos nuevas citas para el Mediterráneo y también un importante hallazgo sobre la enigmática especie *Dendrobrachia bonsai*. Algunas imágenes de los hábitats de profundidad, que muestran algunas de las especies estudiadas, completan la información obtenida por las exploraciones mencionadas.

Palabras clave: corales profundos, Alborán, Mediterráneo, montañas submarinas Ormonde y Gorrige, Sur de Portugal.

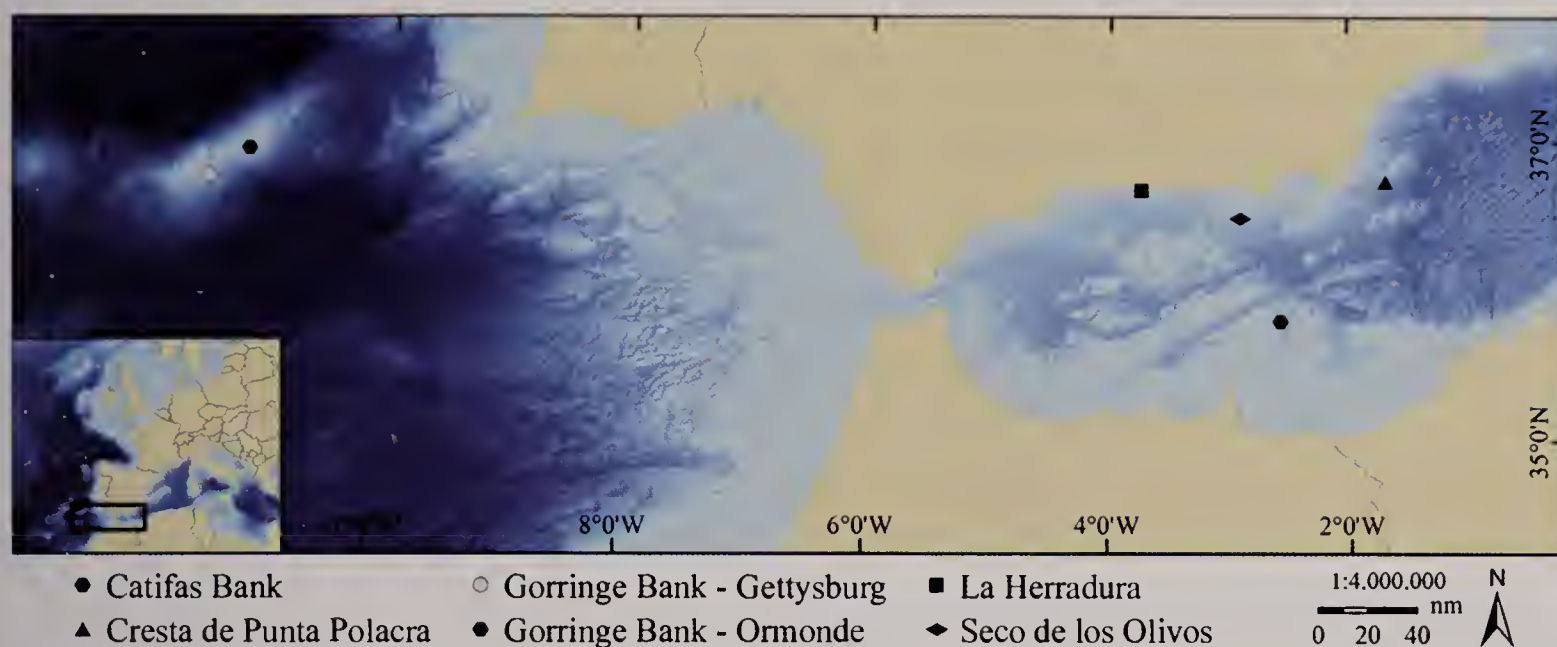
1. INTRODUCTION

Along summer in 2011 Oceana campaigns explored several cold corals spots located in Alboran (Seco de los Olivos, Cresta de Punta Polacra, La Herradura y Catifas bank) and the submarine mountains at South Portugal (Gorringe bank: Gettysburg and Ormonde peaks). A digital guide was already published (OLIVEIRA *et al.*, 2017) about Gorringe submarine mountain or bank. The present paper shows some selected cold water corals of scientific and ecological interest. Historically, Alboran Sea and the Eastern Atlantic submarine mountains have been studied by diverse European explorations from the XIX century till nowadays. Recently, some exploration efforts have been focused on Alboran sea with conservation purpose in the context of the European projects. In Alboran context there are two European protected areas: South Almeria-Seco de los Olivos (LIC ESZZ16003) and the Marine Space of Alboran (LIC ESZZ16005). The cold corals studied in the present paper deal with diverse groups of Anthozoa with skeleton and its benthic assemblages, showing morphological and ecological characteristics. Some of them are already known from the studied area but others are new records from the Mediterranean as *Coenosmilia fecunda* or *Nicella granifera*. Special importance have the found of the species *Dendrobrachia bonsai* in the Alboran bottoms. It is already well known the presence of this last species, but we feel it did not receive the appropriate attention, taking into account that *Dendrobrachia* is an enigmatic genus and family, among two different morphological Anthozoa lines. However, not all the searched species have been studied due to the absence of samples, as the case of the genus *Leiopathes*. There are several species of such genus in the North East Atlantic region (see FERNANDES de MATOS, 2010) and can be plausible to find at least two of them living in Alboran deep bottoms.

2. MATERIAL AND METHODS

Samples of deep bottoms from Alboran Sea (Seco de los Olivos, Cresta de Punta Polacra, La Herradura y Catifas bank) and submarine mountains located at South Portugal (Gorringe bank: Gettysburg and Ormonde peaks) were searched and collected by using a Remote Operate Vehicle (ROV). Most of the samples came from the first meters down to 500 meters depth. Almost 40 hours of video were analyzed. All the ROV surveys were performed from the Ketch Catamaran Ranger using a Saab Seaeye Falcon DR ROV equipped with two forward-facing video cameras: (1) a high-definition camera with 1920x1080 resolution, 1/2.9" Exmor R CMOS Sensor, minimum scene illumination of 3-11 Lux, and a 4-48 mm, f/1.8-3.4 zoom lens; and (2) a high resolution camera of 540 TVL, 1/2" interline transfer CCD sensor, sensitivity of 0.35 Lux, and a 1/2" aspherical, wide-angle, fixed-focus lens, with Horizontal Field of View of 91° and a Tilt $\pm 90^\circ$. The position of the ROV was continuously recorded using a LinkQuest Tracklink USBL Transponder with up to 0.25° accuracy. All samples were taken with the manipulator skid of the ROV.

Specimens were preserved in 8% sea water formaldehyde, and later stored in 70% alcohol in the collections of the "Museo del Mar de Ceuta (MMC)". Colonies of Scleractinia and Octocoral sclerites were prepared using hypochlorite, in order to remove the organic tissues to study the general morphology and the anatomical features of the skeleton



Locations map with the explored sites.

by means of a stereo dissecting microscope. Sclerites were examined with a light microscope equipped with a Normarski differential interference contrast optic system. The classification and terminology of sclerites follows BAYER, GRASSHOFF & VERSEVELDT (1983). The scales are included into the images or indicated in the legend of the figures; in the cases of the black and white scale bar are divided in centimeters. All the examined material and locations are included in the text.

3. RESULTS

Subclass Octocorallia Order Alcyonacea

Family Acanthogorgiidae Gray, 1857 (Figures 1-2)

Acanthogorgia hirsuta Gray, 1857

Acanthogorgia hirsuta Gray, 1857: 128. Description and distribution.

Acanthogorgia hirsuta, Grasshoff, 1973: 2, figs. 1-4, 10. Broad description, Mediterranean and Atlantic distribution.

Acanthogorgia hirsuta, Carpine et Grasshoff, 1975: 68, figs. 36-37. Description and distribution: Azores, Morocco, Portugal, Strait of Gibraltar, Marseille, Corse and Naples.

Acanthogorgia hirsuta, Brito & Ocaña, 2004: 211, figs. 13-14. Description, ecology and distribution in Canary Islands.

Acanthogorgia hirsuta, Weinberg & Grasshoff, 2004: 434-435, 2 images. Mediterranean and Atlantic.

Material examined: MMC-440; M048, 07/08/2011, Catifas Bank, 465 m; 35°50.0899'N 002°34.3485'W; one colony. Alboran Sea.

Remarks: WEINBERG & GRASSHOFF (2003) recorded the species in Gibraltar, Corsica, Marseille and Naples. There are other citations along the Mediterranean included



Figure 1.-
A. hirsuta specimen
 and details of the colony
 and polyps.

Acanthogorgia hirsuta selected sclerites

Spindles

Rods



Figure 2.-
A. hirsuta sclerites.

into some ecological publications but with no studied material, nor taxonomist confirmation. We add some characteristic sclerites to recognize the species but a complete description should be consulted in GRASSHOFF (1973) and BRITO & OCAÑA (2004).

Family Paramuriceidae Bayer, 1956

Placogorgia massiliensis Carpine & Grasshoff, 1975 (Figures 3-4)

Placogorgia massiliensis Carpine et Grasshoff, 1975: 43 Description and images of the colony and sclerites; Mediterranean Sea: Gibraltar and Marseille.

Placogorgia massiliensis, Grasshoff, 1977b: 27, only brief comments on this Mediterranean species in relation to the other species from the Atlantic and Mediterranean.

Placogorgia massiliensis, Weinberg & Grasshoff, 2003: 432, repetition of the images, Gibraltar and Marseille.

Material examined: MMC-427, M15, 18/07/2011, yellow color, two colonies of 8 and 10 cm, Seco de los Olivos, 431 m, 36°31.7926'N 002°54.7470'W. Alboran Sea.

Remarks: the species have been previously recorded twice in the Mediterranean and we have also found it in the Alboran basin on 431 meters deep. Morphological features are included (colonial branching and sclerites) and it can be observed that our colony is more bushy than those samples studied by CARPINE & GRASSHOFF (1975). This is

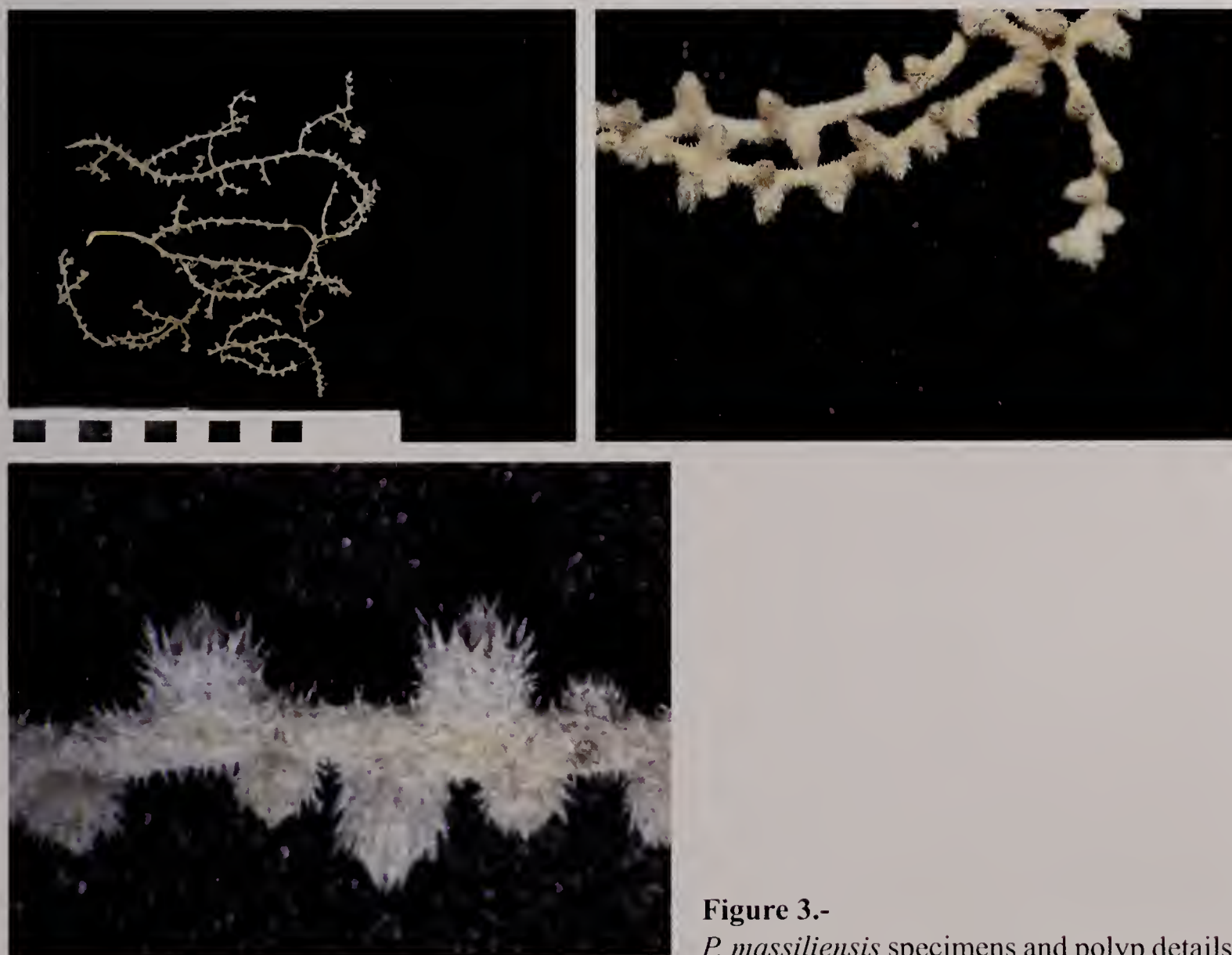


Figure 3.-
P. massiliensis specimens and polyp details.



Figure 4.- *P. massiliensis* sclerites.

the third record of this species exclusively known from the Mediterranean. The species should be distributed along the Western Mediterranean and perhaps also in the nearby Atlantic bottoms.

Spinimuricea atlantica (Johnson, 1862) (Figures 5-7)

Acanthogorgia atlántica Jonhson, 1862: 194, figs. 1-5. Madeira

Paramuricea placomus Thomson, 1927: 39, pl. 4.

Echinomuricea atlantica, Grasshoff, 1977b: 42, figs. 34-36. Complete description of the species, SEM sclerite images. From Galicia to Guinea Gulf including Alboran Sea in the Mediterranean.

Echinomuricea atlantica, López-González, 1993, Lams. 3C y 25. Descripción and characteristics including the SEM images. Strait of Gibraltar and Alboran Sea.

Spinimuricea atlantica, Grasshoff, 1992: 85-87, abb., 148 and 151. Grasshoff set up the genus *Spinimuricea*. From Galicia to Guinea Gulf including Alboran Sea in the Mediterranean.

Spinimuricea atlantica, Brito & Ocaña, 2004: 227-230, Lams. 22-23. Diagnosis and main features of the colonies including the SEM sclerites. 145 meters deep in Tenerife (Canary Islands).

Material examined: MMC- 437, H1, 16/07/2011, Punta de la Mona, La Herradura, one colony; 69 m, 36°42.8226'N 003°44.1814'W. Alboran Sea.

Remarks: This new record confirms the presence of the species along the Alboran Sea through the time (see GRASSHOFF, 1977 and 1992). Branched spindles are the main distinctive character of the species regarding the other species *Spinimuricea klavereni* (Carpine & Grasshoff, 1975) exclusively distributed along the Western Mediterranean. The species was collected in soft bottoms.

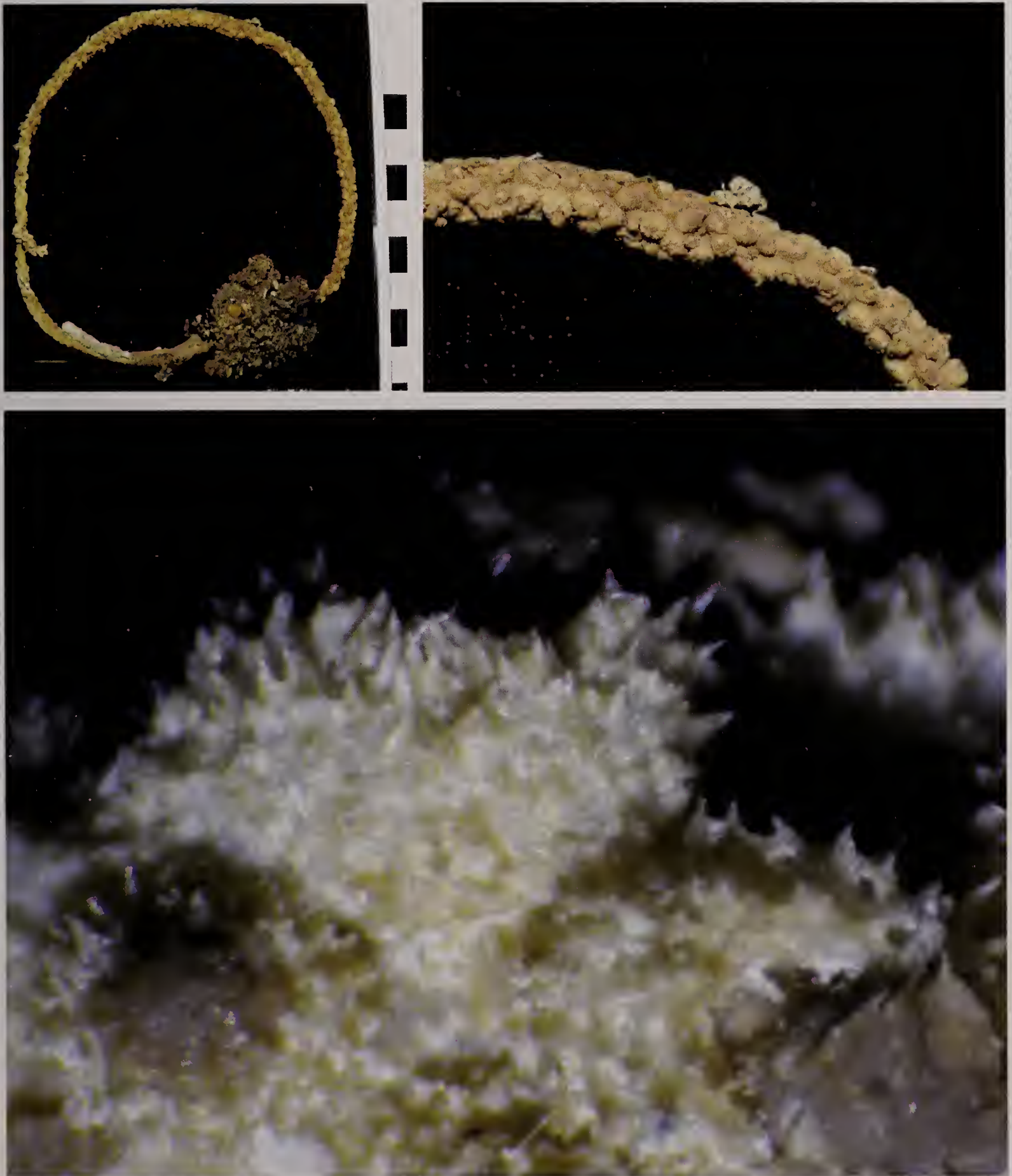


Figure 5.- *S. atlantica* specimen and polyp details.



Figure 6.- *S. atlantica* in the habitat searched, off Punta de la Mona.

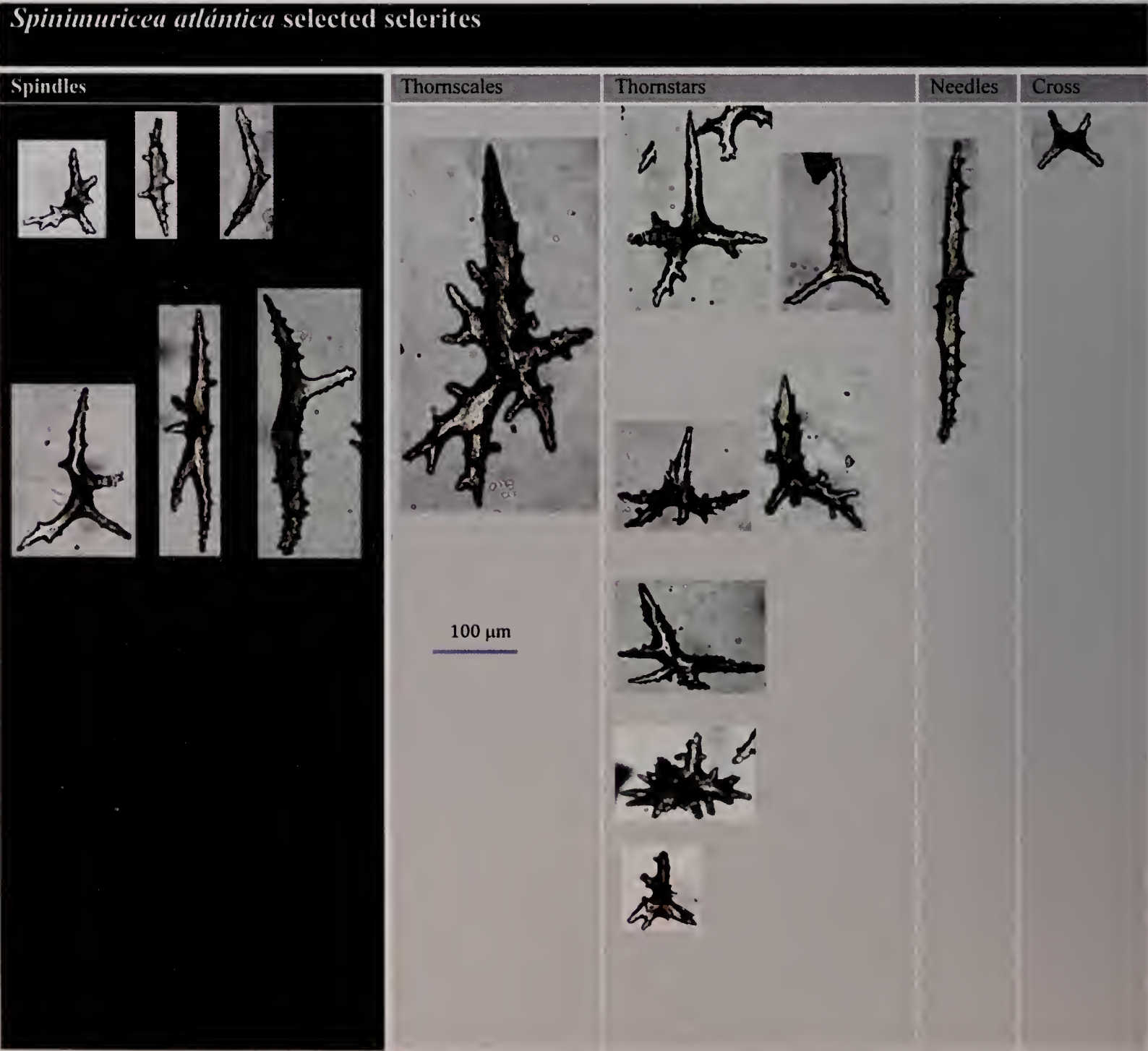


Figure 7.- *S. atlantica* sclerites.

Swiftia dubia (Thomson, 1929) (Figures 8-9)

Stenogorgia dubia Thomson, 1929: 7-8. Brief description including the key characters to identify the species. Vizcaya Gulf.

Stenogorgia miniata, Studer, 1901: 53, Pl. VIII, figs. 7-8. Brief diagnosis and sclerites description with images of the colony.

Swiftia pallida, Madsen, 1970: see Grasshoff, 1977: 65.

Swiftia rosea, Tixier-Durivault et D'Hondt, 1974: 1400-1401. There is not description. Scandinavian, Azores, Canaries, Cape Verde, Ascension and also Florida and Grenada island.

Swiftia pallida, Carpine et Grasshoff, 1975: 62-67, figs. 32-35. Description, ecology and colony and sclerite images. Marseille, Corse, Alboran, Greek.

Swiftia pallida, Grasshoff, 1977: 65-67. Description and images of the colonies and sclerites. Atlantic: Ireland, Vizcaya Gulf, Morocco coast, Azores, Madeira; Mediterranean: Marseille.

Swiftia pallida, Grasshoff, 1981: 213-230. Distribution at the Mid-Atlantic Ridge back of the Azores Islands.

Swiftia pallida, Grasshoff, 1982: 946, Abb. 11-12. East Atlantic and Mediterranean.

Swiftia dubia, Grasshoff, 1986: 21. After searched the type material in Monaco the author recognise the chronological priority of *S. dubia*.

Swiftia dubia, Grasshoff, 1989: 208-209, distributed in both faces of the Strait of Gibraltar and Alboran Sea.

Swiftia dubia, Grasshoff, 1992: 92, the author just recognises the species in Thomson (1929) and includes some data about the distribution.

Swiftia pallida, Brito & Ocaña, 2004: 243-246, Lam. 31. Diagnosis, ecology and some remarks regarding the taxonomic problems with *Swiftia dubia*, Canary Islands.

Swiftia pallida, Weinberg & Grasshoff, 2003: 434-435, three images, repetition of some data from Grasshoff (1977), distribution follows those data published by Carpine et Grasshoff regarding the Mediterranean and along the Atlantic as follow: Ireland, British Islands, Vizcaya Gulf, Portugal, Azores, Madeira, Morocco.

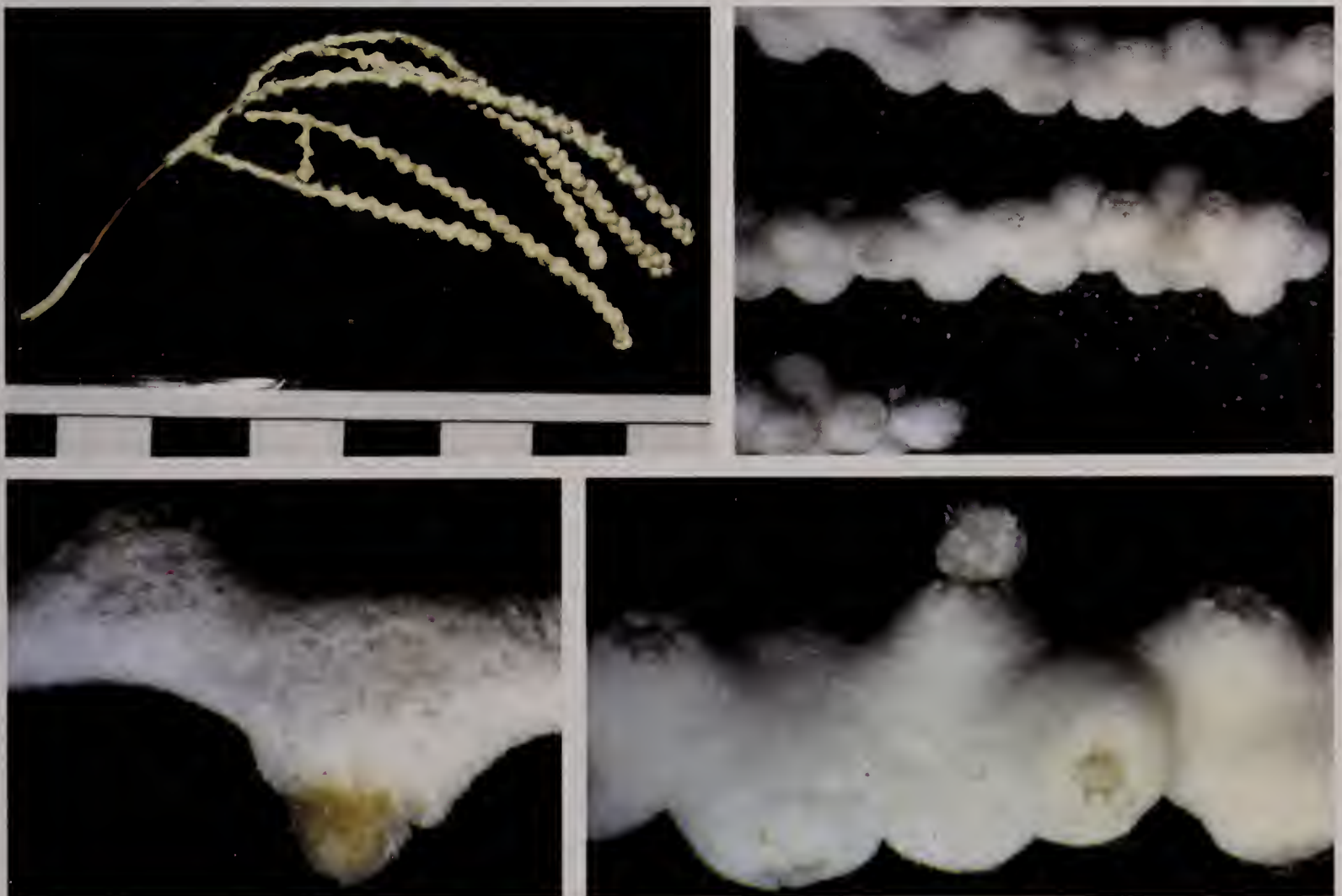


Figure 8.- *S. dubia* specimen and polyp details.

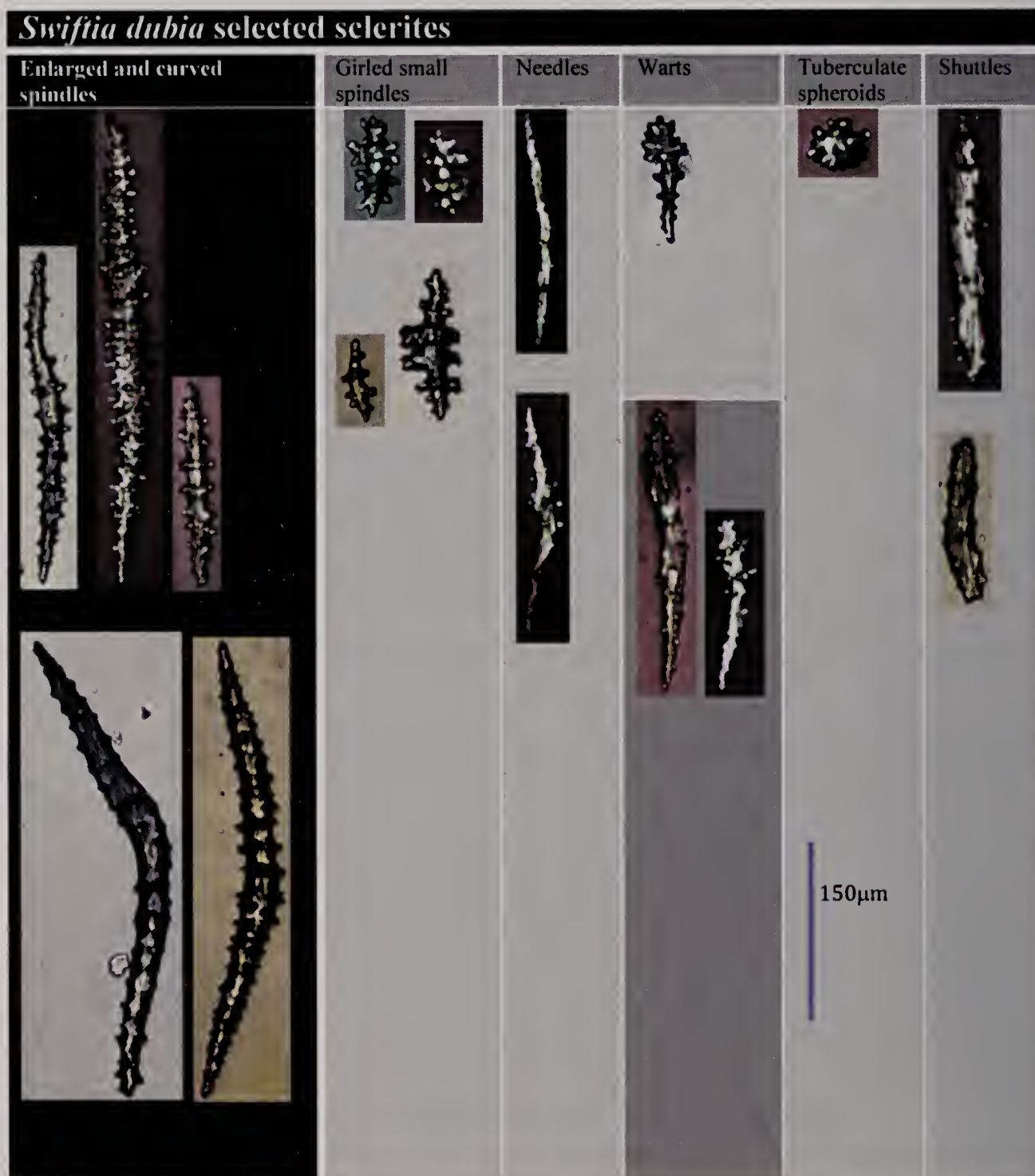


Figure 9.- *S. dubia* sclerites.

Material examined: MMC-433, M17, 21/07/2011, Seco de los Olivos, one colony; 116 m, 36°30.7926'N 002°51.0256'W. Alboran Sea.

Remarks: BRITO & OCAÑA (2004) were not sure about the identity of *S. dubia* described by Thomson in a brief document with no drawings (see THOMSON, 1929) mainly because *S. pallida* was validated in a Mediterranean book (see WEINBERG & GRASSHOFF, 2003). Nevertheless, and according to GRASSHOFF (1986) who revised the Thomson's type material of *Stenogorgia dubia*, the last species is identical to *S. pallida*. There is not any European or West African gorgonian with such numerous spindle and needle sclerites. There is a misunderstanding regarding the general distribution of the species since TIXIER-DURIVAUT (1975) extended the distribution range of the species to Cape Verde and Florida; Grasshoff partially assumed Tixier-Durivault distribution including Cape Verde (see GRASSHOFF, 1977). Although in an older paper, specially focussed on species distribution (GRASSHOFF, 1982), *S. pallida* (= *S. dubia*) were not found

downwards 30° of latitude and nor in America, we assume this last distribution range. The species have been already recorded in the Strait of Gibraltar, Alboran Sea and the Western Mediterranean basin. *S. dubia* seems an abundant species along the North East Atlantic region and it can form deep benthonic assemblages with *Caryophyllia smithii* var. *clavus* and other gorgonians growing on detritic bottoms; recently there is some images on *S. dubia* habitats (OLIVEIRA *et al.*, 2017). The differences of coloration and branching and polyps density along its geographical distribution can be searched using several taxonomical methods in order to find intraspecific variability and even different cryptic species.

Family Ellisellidae Gray, 1859

Ellisella paraplexauroides Stiasny, 1936 (Figures 10-12 and 15)

Ellisella paraplexauroides Stiasny, 1936: 22, pl., 4, figs., 6 and 8. Cape Blanco.

Ellisella paraplexauroides, Carpine et Grasshoff, 1975: 98, figs., 53 and 54. Diagnosis, colony and sclerite features; African shores of the Mediterranean.

Ellisella paraplexauroides, Grasshoff, 1972: 81-83, abb 2 and 7. General description and sclerites drawing. Mediterranean and West African coasts from Tunisia to Cape Blanco.

Ellisella paraplexauroides, Grasshoff, 1977a: 30, figs., 11-12. Brief diagnosis and images of the main sclerites and colony morphology. Puerto de las Nieves, Gran Canaria.

Ellisella paraplexauroides, Grasshoff, 1992: 90-91, abb 150 and 154. Brief diagnosis and distribution from Tunisia to Angola.

Ellisella paraplexauroides, Brito & Ocaña, 2004: 261-265, fig., 145 and Lams., 39 and 40. Description, ecology, distribution and remarks.

Ellisella paraplexauroides, Weinberg & Grasshoff, 2003: 442, 1 image. Mediterranean and Atlantic

Ellisella paraplexauroides, Angiolillo *et al.*, 2012: 1-8, figs., 1-3. Descriptive characters and colonies pictures and sclerite SEM images. Pantelleria Island.

Material examined: MMC-431, M046, 04/08/2011, Submarine mountainins South Portugal: Gorringe bank, Ormonde peak; 132 m, 36°42.8692'N 011°03.3866'W. North East Atlantic.

Remarks: We found crosses among the sclerites of the analyzed specimens although these categories were not recorded previously (see CARPINE & GRASSHOFF, 1975; GRASSHOFF, 1972; GRASSHOFF, 1977a; BRITO & OCAÑA, 2004; WEINBERG & GRASSHOFF, 2003; ANGIOLILLO *et al.*, 2012). The scarcity of the crosses should be the reason not to include them in the previous publications as it happens with the other species of the Ellisellidae family searched in our present paper. Some hydroids growing on the branches tip have been observed in our samples and as a consequence of that unusual morphologies those are noticed (see fig. 10). Elongate coenenchyme on the gorgonian's tip should be the reaction of those octocoral to this hydroids parasitism. We can not reject the fishing interaction as the origin of this growths because the accidental injuries caused by the fishing activities may facilitate the hydroids settlement. The weird way of branching should be also due to the injuries caused by the fishing (see OLIVEIRA *et al.*, 2017: 139 and Fig. 12).

The species is widely spread mainly along the Atlantic (GRASSHOFF, 1992) and also in the African coast of the Western Mediterranean (see ANGIOLILLO *et al.*, 2012). *E. paraplexauroides* contribute to increase the importance of benthic assamblages in cir-



Figure 10.-
E. paraplexauroides specimens,
 polyps and malformations.

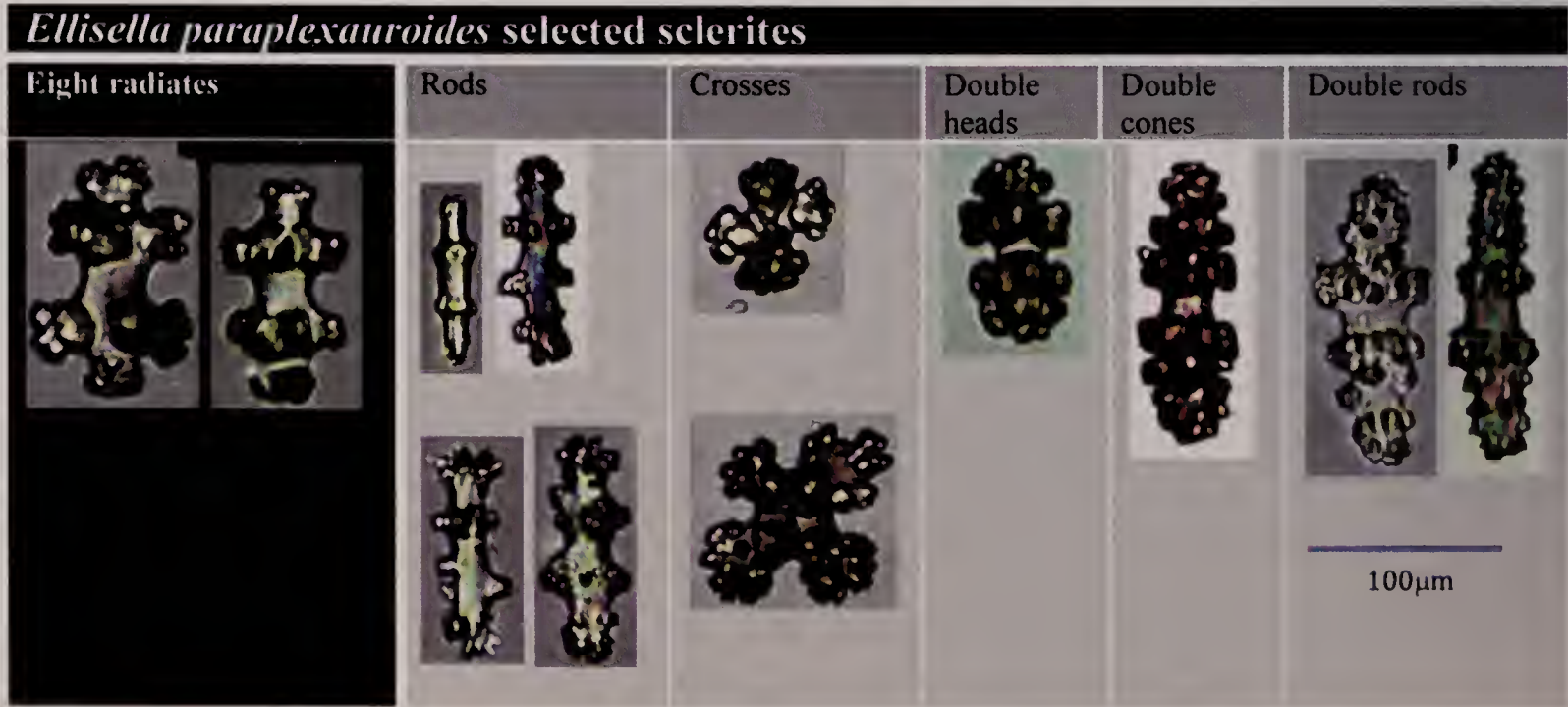


Figure 11.- *E. paraplexauroides* sclerites.



Figure 12.- *E. paraplexauroides* shows a weird branching in Ormond bottoms.

calitoral and possibly also in upper bathial bottoms from Macaronesian waters and Alboran Sea (see OCAÑA & BRITO, 2004). The ecological importance of these assemblages have been remarked by the Spanish Ministry of Environment into the Spanish Inventory of Marine Habitats and Species (TEMPLADO *et al.*, 2012). In the Alboran sea, *E. paraplexauroides* follows a typical mesophotic distribution and although it is not the most abundant gorgonian it is quite common between 30 and 60 meters deep along the African coast of the Strait of Gibraltar and Alboran Sea (see OCAÑA *et al.*, 2009). In fact, beyond the Alboran basin towards the Mediterranean the species seems to be absent or scarce and difficult to be observed with the exception of some particular sites as Pantelleria Island. This island as well as the Sicily Strait and Tunisia coast is strongly influenced by the Atlantic water and perhaps may explain the presence of *E. paraplexauroides* in these places (see CARPINE & GRASSHOFF, 1975 and ANGIOLILLO *et al.*, 2012).

Viminella flagellum (Johnson, 1863) (Figures 13-15)

Juncella flagellum Johnson, 1863:505. Brief descriptions and drawings, Madeira.

Scirpearia flagellum, Studer, 1901: 53, Plate IX, figs. 1-3 and Plate XI, figs., 10-11. Very short description and beautiful drawings with crosses.

Scirpearia flagellum, Thomson, 1927: 53, plate.4, fig. 20. Brief description and beautiful drawings of colonial features and sclerites, Morocco.

Ellisella flagellum, Grasshoff, 1972: 75, figs. 1-6. Extensive description, including sclerites and their variability, and distribution through the Norht Eastern Atlantic (Meteor and Josephine Banks; Azores; Madeira, Canary Islands, Cape Verde Islands, Morocco coast).

Ellisella flagellum, Carpine et Grasshoff, 1975: Brief description and main sclerites to identify the species, Corsica.

Viminella flagellum, Weinberg & Grasshoff, 2003: 442. Brief description and sclerites drawings.

Viminella flagellum, Brito & Ocaña, 2004: 265-267, figs., 4-5, Lam. 41. Description, ecology, distribution and remarks.

Viminella flagellum, Giusti et al., 2017: record from Italian waters, including main colonial features and sclerites.

Material examined: MMC-430; M039, 02/08/2011, Submarine mountainins South Portugal: Gorringe bank, Gettysbourg peak, three fragments; 348 m, 36°30.9366'N 011°28.5745'W. North East Atlantic.

Remarks: Recently, Italian authors recorded and morphologically confirmed the species from Pantelleria and commented the presence of *V. flagellum* from Alboran Sea and Western Mediterranean based on ROV images (see GIUSTI *et al.*, 2017). *V. flagellum* have been observed abundantly in Italian waters (see GIUSTI *et al.*, 2017). This is a new



Figure 13.- *V. flagellum* fragments and polyps.

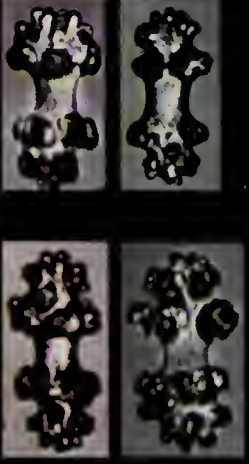
<i>Viminella flagellum</i> selected sclerites						
Eight radiates	Rods	Crosses	Double stars	Double cones	Double rods	Double flat rods
				 90µm		

Figure 14.- *V. flagellum* sclerites.



Figure 15.- Cold coral assemblages with Ellisellidae in deep bottoms from Ormond mountain.

record from North Eastern Atlantic confirmed by the studied material. Since THOMSON (1927) there are not recent published records of *V. flagellum* from Souss region in Morocco although the species should be spread along the Moroccan Atlantic bathial bottoms. STUDER (1901) included drawings of crosses sclerites in this species but after him we are unable to find signs of such sclerites in other authors. We find out them in our material as well as in other Ellisellidae included in the present paper, so we conclude that in spite that these crosses are sparse and not common, they should be included as part of the species features to prevent future wrong interpretations of this character.

Nicella granifera (Koelliker, 1865) (Figures 16-17)

Verrucella granifera Koelliker, 1865: 140, Tafel 19, figs., 5 and 12.

Gornonella gueneri Studer, 1901: 54, Plate IX, figs. 7-10. Description with colony and sclerites features. Azores.

Nicella granifera, Grasshoff, 1972: 82, Abb. 3 y 8. Description and variability with remarks; sclerite drawings and colony feature.

Material examined: MMC- 434, M14, 18/07/2014, Seco de los Olivos, one colony; 430 m, 36°31.7707N 002°54.9458'W. Alboran Sea.

Remarks: The species is the minor sized into the Ellisellidae family and never was found out previously in the Mediterranean region. This species can be locally abundant forming characteristics facies and growing on calcareous debris. It was recently recorded also in Gorringe bank (see OLIVEIRA *et al.*, 2017). This is a new record from the Mediterranean Sea.

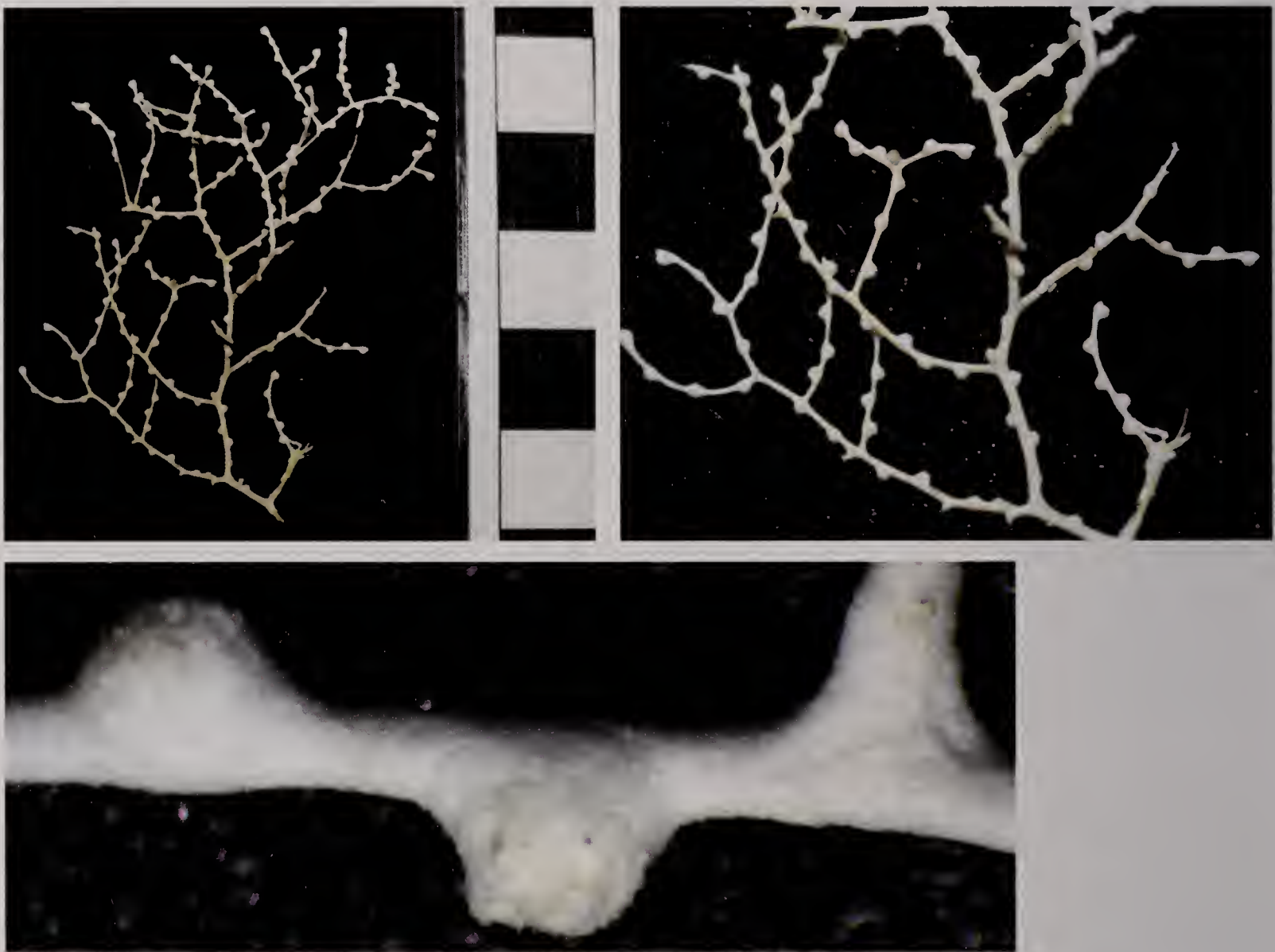


Figure 16.- *N. granifera* specimen and polyps.

<i>Nicella granifera</i> selected sclerites					
Rods	Crosses	Double heads	Double cones	Double rods	Miniature rods
			90μm		

Figure 17.- *N. granifera* sclerites.

Family Dendrobrachiidae Brook, 1889

Dendrobrachia bonsai López-González & Cunha, 2010 (Figures 18-21)

Dendrobrachia bonsai López-González & Cunha, 2010: 423-434, 9 figures. Description of two new species, one from Cape Verde and the other from Gulf Ibero-Marroquí and Malta.

Dendrobrachia bonsai, Sartoretto, 2012: 1-4, 3 figs., some ecological observations morphological data. Distribution along Corsica.

Dendrobrachia fallax, Zibrowius & Taviani, 2005: 813-815, fig. 3. Mentioned in a general chapter about the Strait of Sicily, collected in Seco de los Olivos.

Material Examined: MMC- 442, M049, 07/08/2011, Catifas bank, one colony, 384 m, growing on *Lophelia pertusa* fragment, 35°52.5370'N 002°33.4350'W. Alboran Sea; MMC-439, M051, 08/08/2011, Seco de los Olivos, one colony, 440 m, growing on the rocky bottom, 36°31.5586'N 002°55.0270'W. Alboran Sea.

Remarks: New record of *D. bonsai* in the Alboran Sea. The species was mentioned in Alboran (see ZIBROWIUS & TAVIANI, 2005), and LÓPEZ-GONZÁLEZ & CUNHA (2010) also mentioned it although without any precise location; all the localities searched by those last authors were located from outside the Mediterranean Sea. Two specimens were collected in the bathial rocky bottoms quite affected by sediments with hydroids, sponges, crinoids and some sparse corals as *Desmophyllum crystagalli* Milne Edwards & Haime, 1848 plus several species of Paramuriceidae. The species of *Dendrobrachia* constitute an enigmatic group of Anthozoa with octocoral polyps and antipatharian skeleton that should be deeply searched to reach a proper understanding. The found of this amazing genus and family in the Mediterranean and the Atlantic can be explained by its ancient origin, possibly in relation with the Tethys Sea (see OCAÑA *et al.*, 2007); Tethyan community of bathyal corals or rest of those may be still alive in some special spots of the Mediterranean deep sea geography.



Figure 18.- *D. bonsai*, MMC-442 specimen growing on *Lophellia pertusa*. Scale bar 2 cm.



Figure 19.- *D. bonsai*, specimen MMC-439.



Figure 20.- *D. bonsai* growing close to sponges and gorgonians from Seco de los Olivos.



Figure 21.- Several colonies of *D. bonsai* close to hydroids and solitary cup coral.

Subclass Hexacorallia

Order Scleractinia Bourne, 1900

Family Caryophylliidae Gray, 1846

Caryophyllia smithii var. *clavus* Stokes & Broderip, 1828 (Figure 22)

Caryophyllia smithii Stokes & Broderip, 1828: 486, pl. 13

Caryophyllia smithii, Zibrowius, 1980: 46-53, pls. 16 et 17. Complete description with images and interesting remarks regarding its ecology, distribution and taxonomy. Mediterranean and East Atlantic from Scandinavian and Iceland to Guinea Gulf.

Caryophyllia smithii, Brito & Ocaña, 2004: 366-368, fig. 77. Diagnosis, ecology. All the islands.

To check a broad synonymous list see Zibrowius, 1980

Material examined: MMC-435; M20, 23/07/2011, Seco de los Olivos, one specimen; 406 m, 36°34.1893'N 002°50'51.15'W. Alboran Sea.

Remarks: The species was previously recorded from Alboran (see ZIBROWIUS, 1980). ZIBROWIUS & SALDANHA (1976) including the repartition of the species along the Portugal coasts and the morphological range of variation. *C. smithii* var. *clavus*

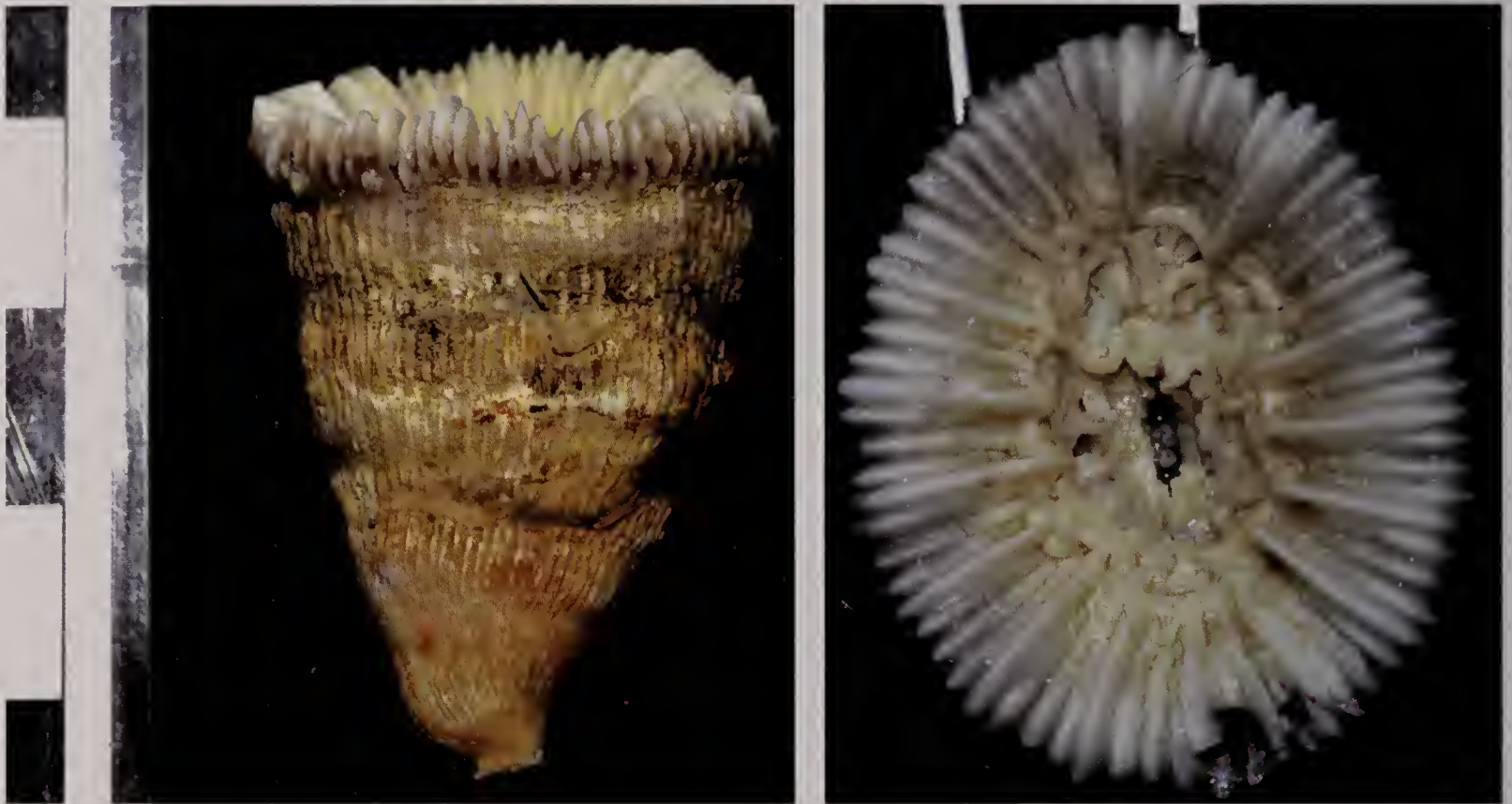


Figure 22.- Specimen MMC- 435 from Seco de los Olivos.

shows a narrowing base and should be common between 200-400 meters deep, usually growing on unstable soft bottoms but also in deep rocky reefs and canyons (see ZIBROWIUS, 1980). In the Canaries this feature was found in specimens growing on *Ditrupa arietina* or free calcareous algae (see BRITO & OCAÑA, 2004). Assamblages between *C. smithii* var. *clavus* with the species *Swiftia dubia* have been observed in deep Alboran basin.

Coenosmilia fecunda (Pourtalés, 1871) (Figure 23)

Coelosmilia fecunda Pourtalés, 1871: 21

Anomocora fecunda, Cairns, 1979: 127, Plate 24, figs., 6-8. Description, remarks and images. Caribbaean Sea.

Coenosmilia fecunda, Zibrowius, 1980: 131-133, Planches 67-68. Description, ecological observations and remarks. Vizcaya Gulf, Portugal, Macaronesian Archipelagos and Western Atlantic.

Coenosmilia fecunda, Brito & Ocaña, 2004: 403-406, fig. 90. Description and ecological distribution. All the Canary islands.

To check a broad synonymous list see Zibrowius, 1980 and also Cairns, 1979.

Material examined: MMC-438; M34, 23/07/2011, Seco de los Olivos, serveral dead colonies; 245 m, 36°31.1061'N 002°48.4629'W. Alboran Sea.

Remarks: *C. fecunda* is ecologically relevant because its contributions to detritic bottoms along the Macaronesian Archipelagos (BRITO & OCAÑA, 2004); in the Meteor mountain the ecological importance of *C. fecunda* should be suspected (see ZIBROWIUS, 1980). All the samples collected from Oceana campaigns were dead colonies, and as they were not intensely colonized by other benthonic organisms, this fact might means that the colonies had died recently, and though we have not any single specimen with soft tissue to

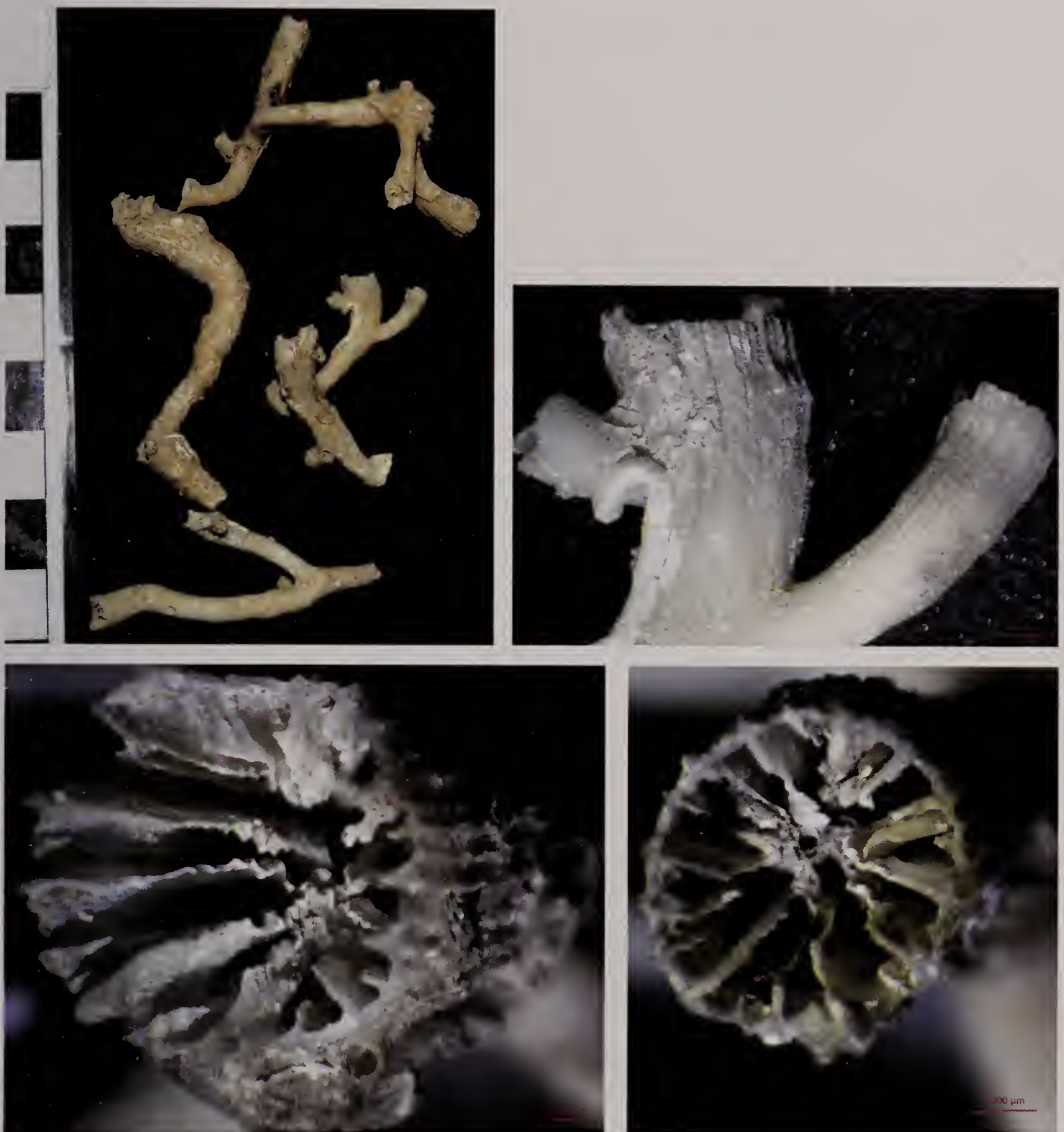


Figure 23.- Specimens of *C. fecunda*.

assure there are living specimens in Alboran, our samples do not look like ancient or fossilized colonies. Recent paleontological studies have suggested the presence of important populations of *C. fecunda* in Alboran basin along the Pliocene period (AGUIRRE *et al.*, 2017); *Lophelia pertusa* (Linnaeus, 1758) seems to be scarce along Mediterranean but it was abundant along the recent Pleistocene (see ZIBROWIUS, 1980). The species belong to a complex cnidarian assemblage with *Dendrophyllia ramea* (Linnaeus, 1758) and *Madrepora oculata* Linnaeus, 1758 found in the Sierra de Utrera (Málaga) so it is quite plausible the presence nowadays of *C. fecunda* populations in Alboran Sea. This is the first record from the Mediterranean.

Lophelia pertusa (Linné, 1758) (Figures 24-26)

Madrepora pertusa Linné, 1758: 797, see Zibrowius, 1980.

Lophelia pertusa, Zibrowius, 1980: 126-130, Fig. 66. Description, ecology and remarks. Mediterranean, wide Atlantic distribution.

Lophelia pertusa, Brito & Ocaña, 2004: 400-403, Fig. 89. Diagnosis based on dead specimens, ecological data. Tenerife and Gran Canaria islands.

To check a broad synonymous list see Zibrowius, 1980

Material examined: MMC-443; M049, 07/08/2011, Catifas bank, Two small fragments; 384 m, 35°52.5370'N 002°33.4350'W. Alboran Sea.

Remarks: The species have been recorded along the Western Mediterranean and scarcely in the Oriental basin, although it was widely recorded along the Atlantic from Scandinavian to South Africa (see ZIBROWIUS, 1980). This is the second time *L. pertusa* is collected from deep Alboran bottoms as the species was previously recorded in 1958 growing on a telegraphic cable (see ZIBROWIUS, 1980). It seems to be abundant in the Vizcaya Gulf as it was exposed by ZIBROWIUS (1980) and recently by other authors (see ALTUNA & RÍOS, 2014). As it happens to *Madrepora oculata*, *L. pertusa* is not abundant in the Mediterranean and possibly it had important populations along the Pleistocene pe-

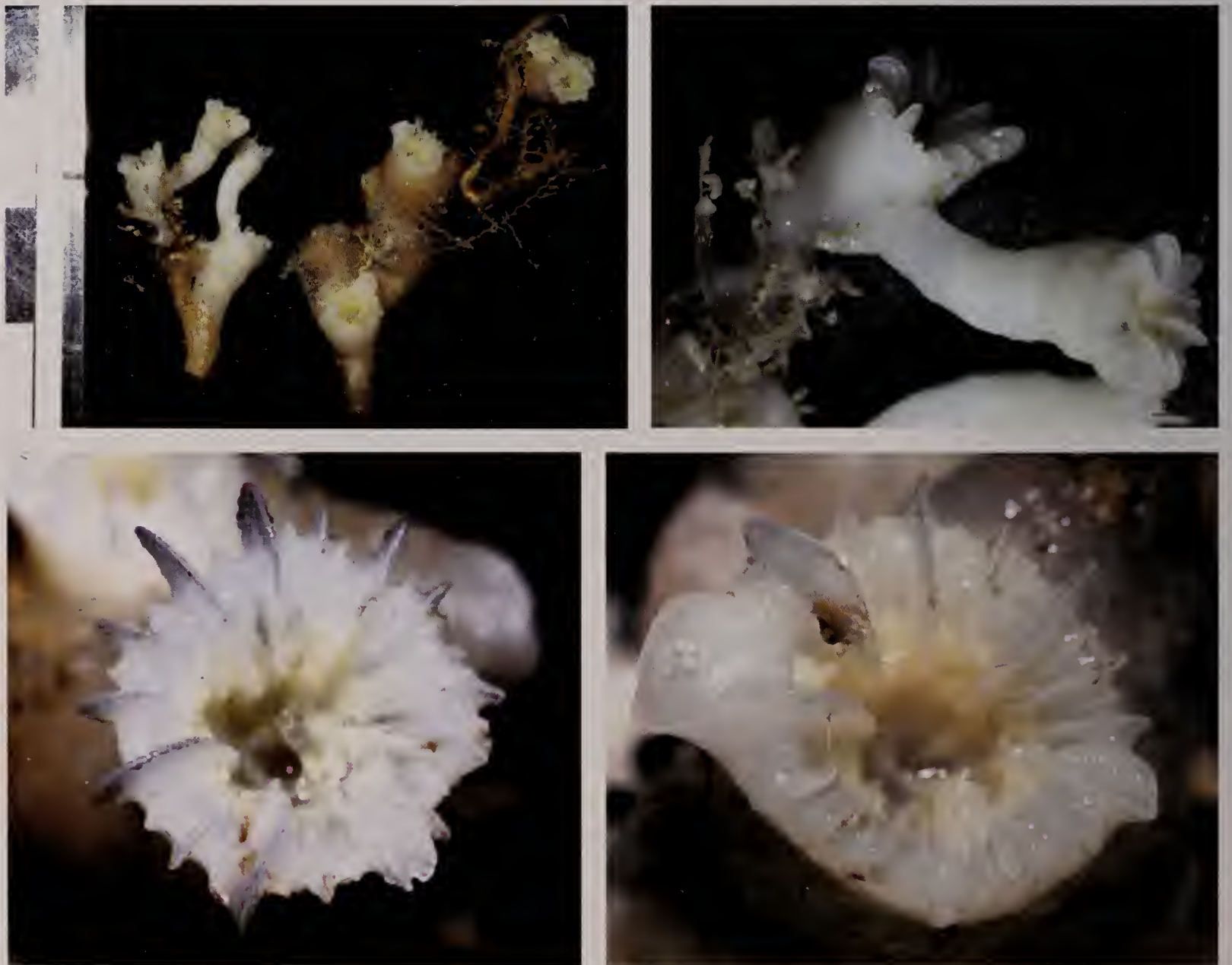


Figure 24.- *L. pertusa* sample and polyp details.



Figure 25.- White coral assamblages (*L. pertusa* and *M. oculata*) with *Desmophyllum cristagalli* in Alboran deep bottoms.



Figure 26.- *Lophellia pertusa* growing close to *Parazoanthus* sp. in deep bottoms of Alboran basin.

riod (see ZIBROWIUS, 1980). In fact, as it has been mentioned in the remarks concerning to *C. fecunda*, a recent paleontological studies have recorded an interesting coral assemblages that have suggested the presence of populations of *M. oculata* in Alboran basin along the Pliocene. So it is quite possible the abundance of such species in that period and possibly also the white coral community, although *L. pertusa* was not observed in the coral deposit till now (see AGUIRRE *et al.*, 2017). Colonies of the enigmatic *Dendrobrachia bonsai* were growing on some corallites of *L. pertusa* forming eventually part of the white coral community.

Family Dendrophylliidae Gray, 1847

Dendrophyllia cornigera (Lamarck, 1816) (Figures 27-28)

Caryophyllia cornigera Lamarck, 1816: 228, see Zibrowius, 1980.

Dendrophyllia cornigera, Zibrowius, 1980: 172, pl. 87. Description, ecological data and remarks. Mediterranean, Atlantic from Ireland to Cape Verde.

Dendrophyllia cornigera, Brito & Ocaña, 2004: 428-431, Figs., 6, 11 y 149; Lam., 100. Description and ecology. The species was collected in several islands from the Canaries but surely should be more extended to the rest of the archipelago.

To check a broad synonymous list see Zibrowius, 1980

Material examined: MMC-436; M044, 03/08/2011, Small colony with four polyps; 109 m, 36°43.0243'N 011°09.5789'W. Submarine mountainins South Portugal: Gorringe bank, Ormonde peak.

Remarks: The species was already recorded from Alboran Sea (see ZIBROWIUS, 1980) and listed also from Alboran Island (TEMPLADO *et al.*, 2006). In the Canaries, *D. cornigera* is able to form the biocenosis of yellow coral with other species between 200-400 meters deep (see BRITO & OCAÑA, 2004: 153). Recently, it has been recognized in the Mediterranean coast of Spain a bathial habitat features by *D. cornigera* assemblages (see TEMPLADO *et al.*, 2012); the species is also found in the Mediterranean coast of

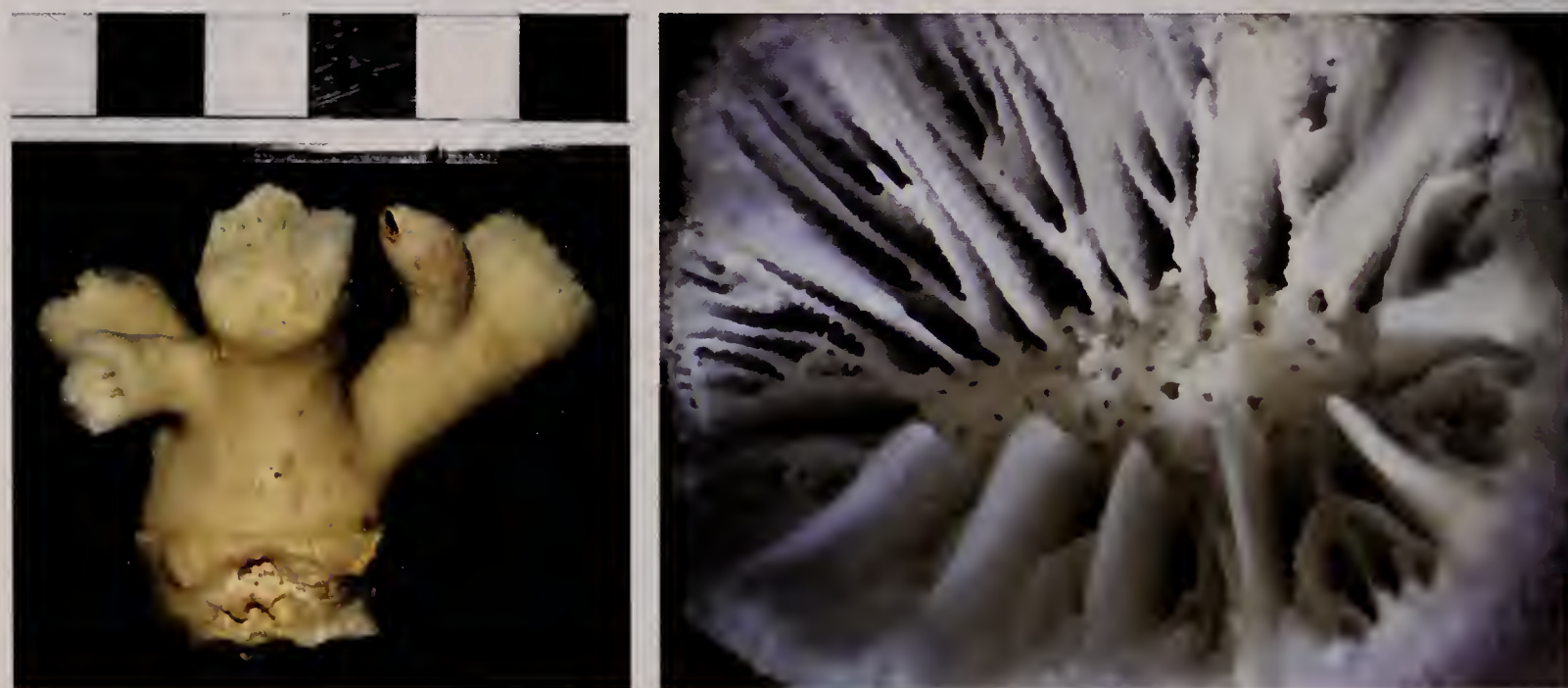


Figure 27.- *D. cornigera*. Specimen MMC-436 from South Portugal submarine mountains.



Figure 28.- *D. cornigera* on rocky bathyal bottoms from Ormonde.

Morocco (see OCAÑA *et al.*, 2015). The presence of the species in Ormonde peak is quite normal taking into account its geographical distribution, also it was noticed the parasitic cirripedia *Megatrema anglicum* (Sowerby, 1823) already observed in the Canaries (see BRITO & OCAÑA, 2004).

Order Antipatharia Milne Edwards, 1857

Family Antipathidae Ehrenberg, 1834

Antipathes dichotoma Pallas, 1766 (Figures 29-30)

Antipathes dichotoma Pallas, 1766,

Antipathes dichotoma, Brook, 1889: 98-100, Pl. XII, fig., 16; Pl. XIII, figs., 1-9; Pl. XIV, figs., 1, 5, 6. Mediterranean, Marseille.

Antipathes dichotoma, Gravier, 1918: 227-229, Planche 13, fig., 3. Description and remarks.

Antipathes dichotoma, Opresko, 2003, figs., 1-5. Redescription of the species and an exhaustive work of comparison with other species of *Antipathes*. Western Mediterranean, Vizcaya Gulf and the Atlantic coast of Morocco.

Antipathes dichotoma, Opresko and Försterra, 2003: 506-509 with images. Mediterranean.

Antipathes dichotoma, Bo, 2008: several pages and Appendix two. Selected morphological features remarks about the species. Mediterranean and Eastern Atlantic.

To check a broad synonymous list see Opresko, 2003.

Material examined: MMC-432; M40, 02/08/2011, Submarine mountains South Portugal: Gorringer bank, Getysbourg peak, one colony fragment, 348 m, 36°30.9366'N 011°28.5745'W. North Eastern Atlantic.

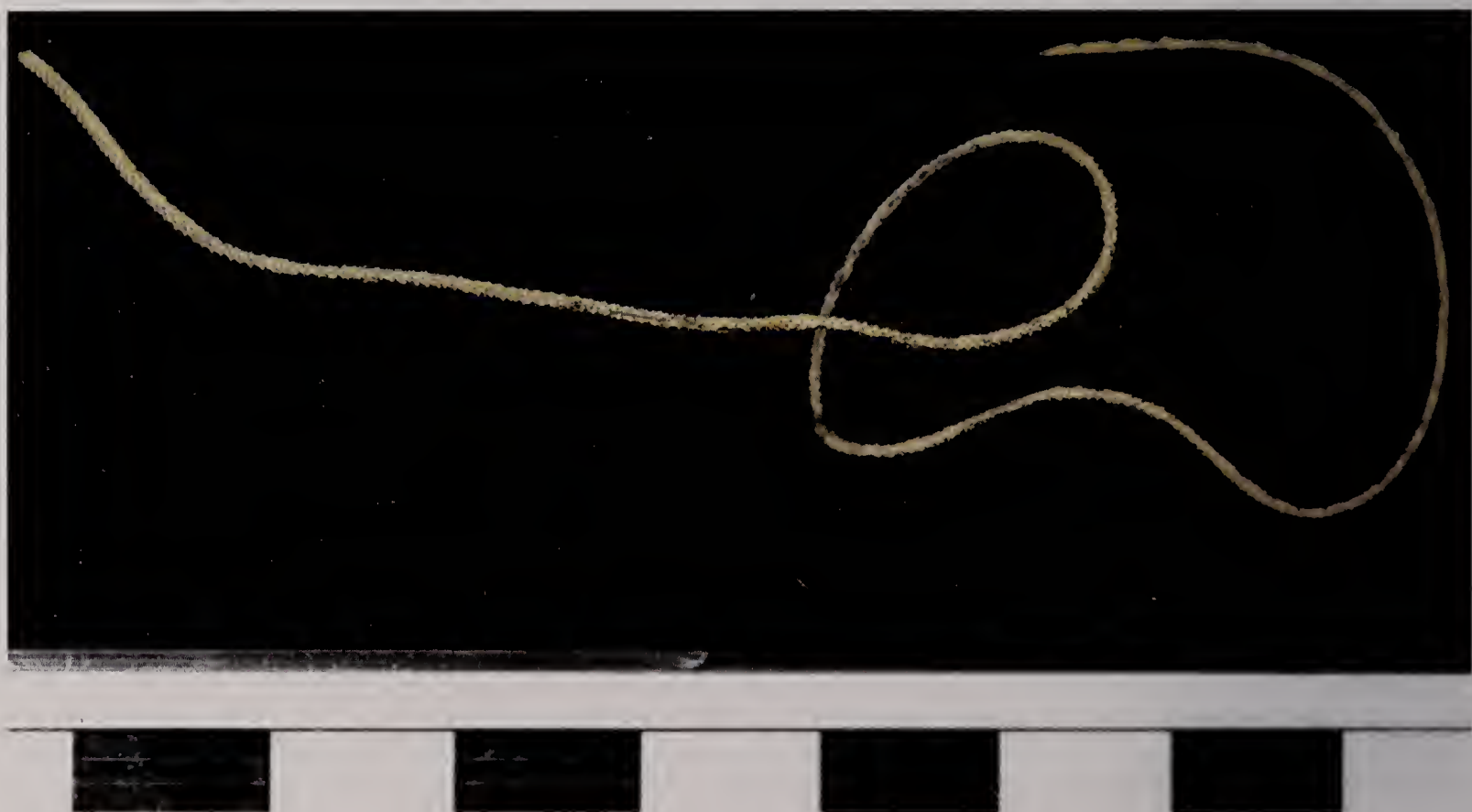


Figure 29.- *A. dichotoma*. General view of the fragment.



Figure 30.- *A. dichotoma*. Spines close up. Scale bar 0.1 cm.

Remarks: Only a fragment of a colony but it fits very well in the description of the *A. dichotoma*: 4-5 polyps per cm; 2-3 smooth spines per mm and 0.15 to 0.27 mm length. *A. dichotoma* was recorded also in some spots along the Atlantic and this new record confirms its presence in the submarine mountains located at South of Portugal.

Family Schizopathidae Brook, 1889 (enmended by Opresko, 2002)

Parantipathes cf. *larix* Esper, 1790 (Figures 31-33)

Parantipathes larix, Brook 1889: 142-143, Pls., 12 (fig., 20); 13 (fig., 2); 15 (fig., 1). Complete description but the whole colony or a portion is not show; spines detail and information about the polyp disposition and histology. Naples, Mediterranean.

Parantipathes larix, Gravier 1918: 236-238, Pl., 12, fig. 1. Description and image of a large colony collected by fishermen. Naples.

Parantipathes larix, Opresko 2002: 435-437, Fig., 15. Diagnosis of selected characters and remarks about the species including into *Parantipathes*.

Material Examined: MMC-444; P1-24/07/2011, Cresta de Punta Polacra, one colony fragment with sea anemones (*Amphianthus* sp.); 505 m, 36°46.3454'N 001°41.3219'W. Alboran Sea.

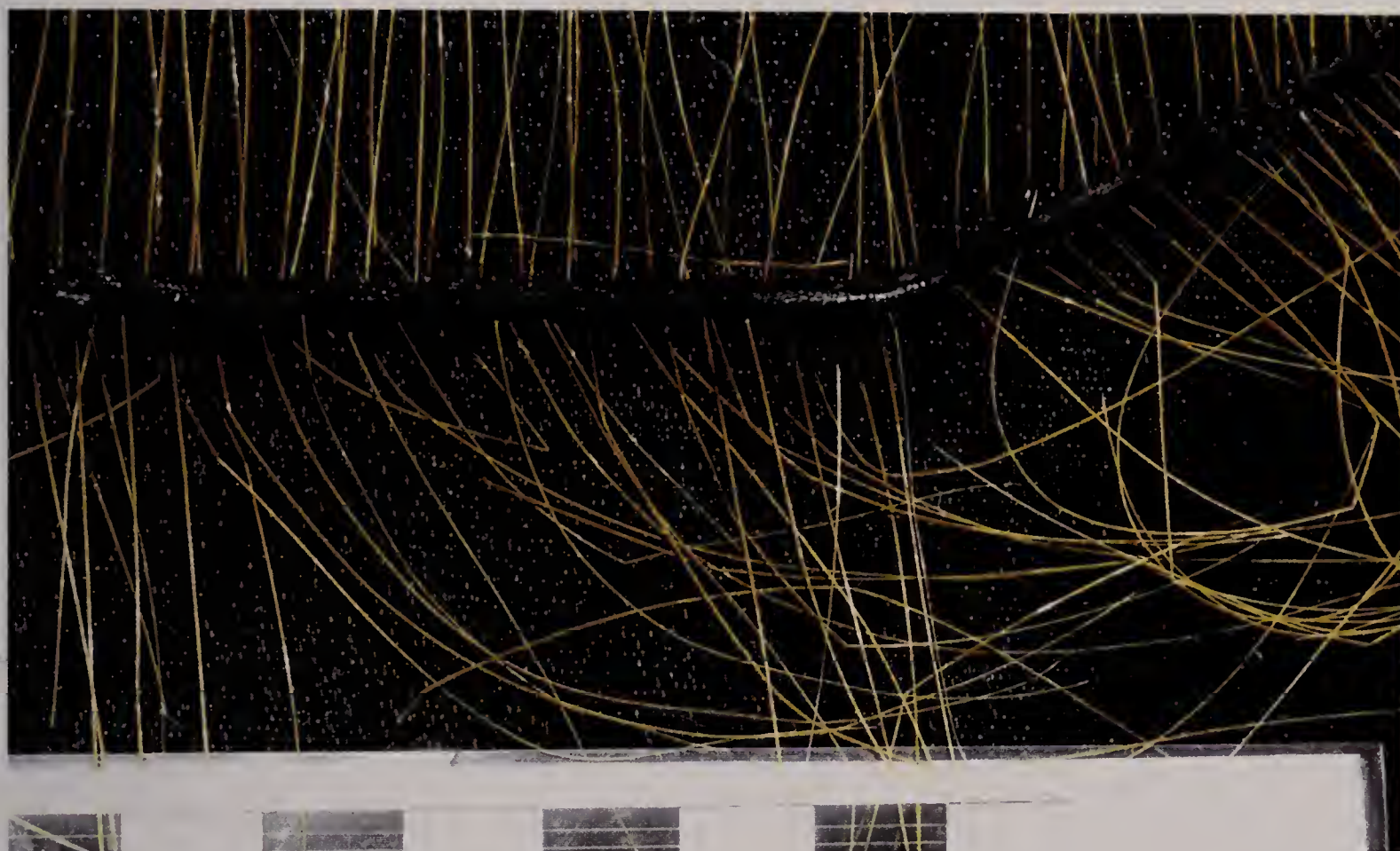


Figure 31.- Stem and pinnulae disposition in *Parantipathes* cf. *larix*.

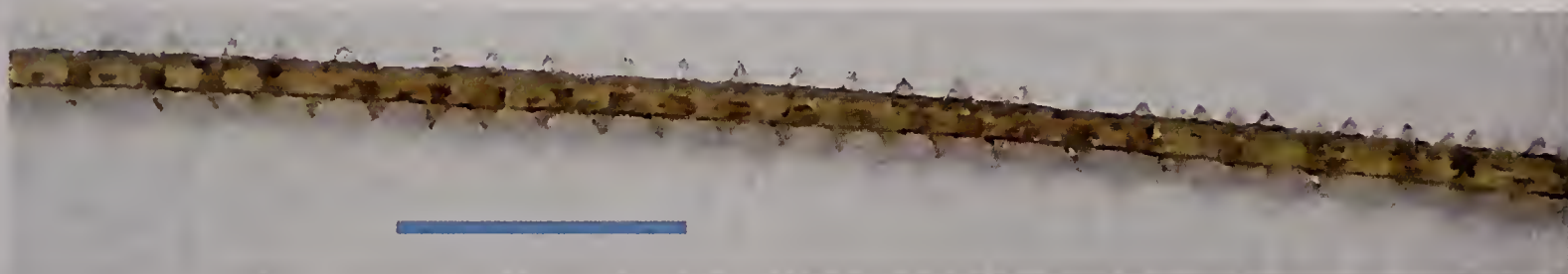


Figure 32.- *Parantipathes* cf. *larix*. Spines detail. Scale bar 0.1 cm.



Figure 33.- *Parantipathes* cf. *larix*. Imagen of the specimen MMC-444 in Punta Polacra deep bottoms.

Remarks: There are some differences between our material and the description of the species given by OPRESKO & BARON SZABO (2001) and also among the colonies morphology found on the Alboran bottoms although we have only sample from one morphological type growing with sparce branches. The general feature is close to *Plumapathes* although the spines are quite different.

Family Myriopathidae Opresko, 2001

Tanacetipathes sp. (Figures 34-36)

Material examined: MMC-426; M043, 03/08/2011, one colony portion; 143 m; 36°42.8961'N 011°10.0351'W. Submarine mountainins South Portugal: Gorringe bank, Ormonde peak, North Eastern Atlantic.



Figure 34.- *Tanacetipathes* sp. General view of the specimen MMC-426.



Figure 35.- *Tanacetipathes* sp. Detail of the spines. Scale bar 0.1 cm.

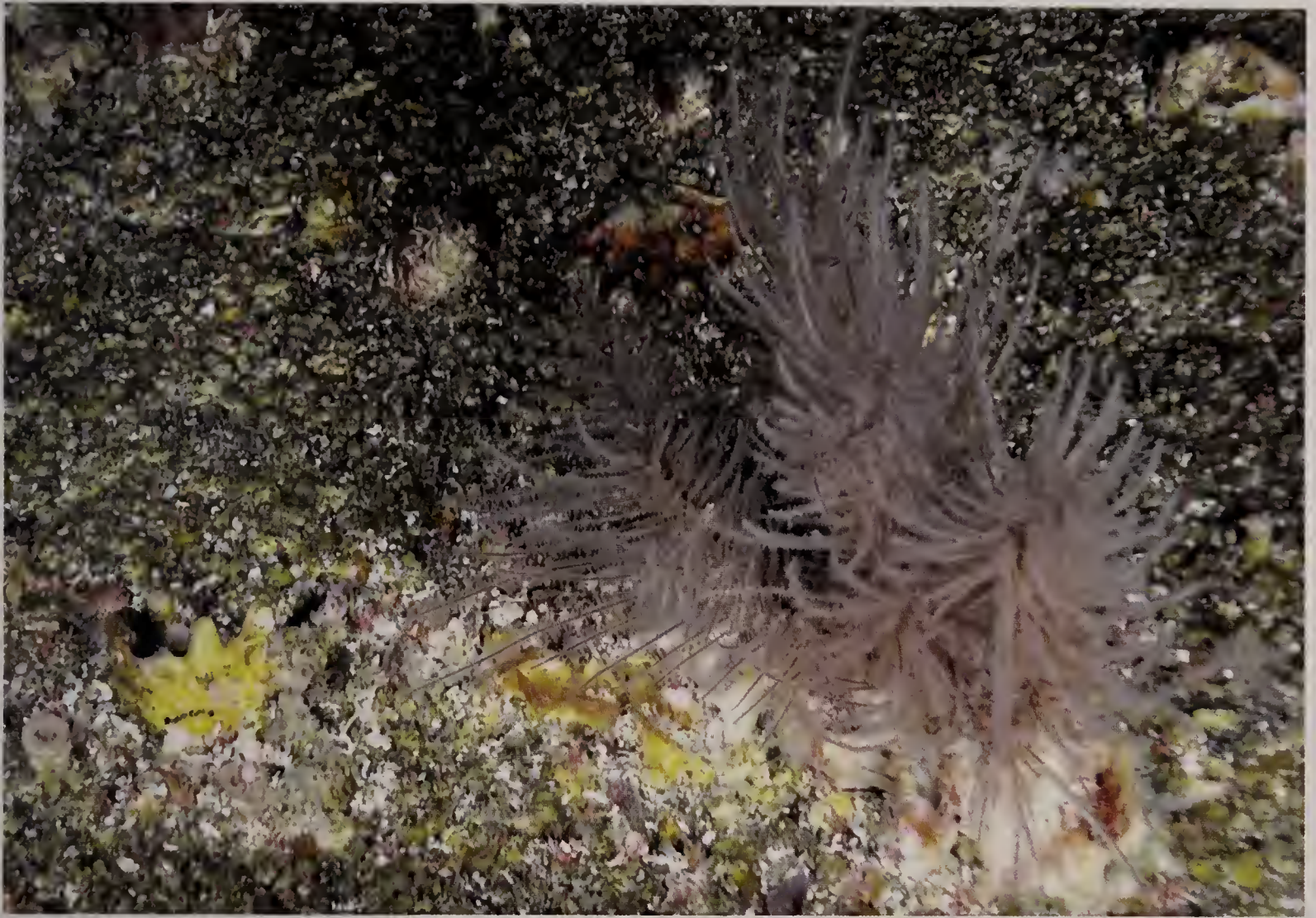


Figure 36.- *Tanacetipathes* sp. growing on Ormonde deep bottoms.

Remarks: A new species known from Madeira and Azores was searched by FERNANDES de MATOS (2010) but still it has to be described in a specific publication. This found can be expected attending to the current distribution of the species.

Antipathella subpinnata (Ellis & Solander, 1786) (Figures 37-39)

Antipathella subpinnata, Brook, 1889: 107-109, Pls. XII (fig., 15), XIII (figs. 3-8), XV (figs., 2, 6). Description including histological sections and skeleton details. Naples.

Parantipathes larix, Gravier 1918: 234-235, Pl., 13, figs., 8, 9. Description and drawings on the spines. Naples.

Antipathella subpinnata, Opresko, 2001: 364-368, figs., 15-18. Description of a neotype and numerous remarks about the species and selected morphological characters.

Antipathella subpinnata, Opresko and Försterra, 2003: 508-509 with images. Mediterranean.

Antipathella subpinnata, Bo et al., 2008: 185-195, figs., 1-5. Description of the specimens including cnidome, distribution and ecology. Mediterranean and some spots of the North Eastern Atlantic.

Material examined: MMC-429; M23, 24/07/2011, Seco de los Olivos, one small colony fragment; 90 m, 36°31.1765'N 002°50.6030'W. Alboran Sea.

Remarks: The species had been previously recorded from Alboran (see BO *et al.*, 2008) but the present are the unique images of the colonies from the deep bottoms of Alboran basin.

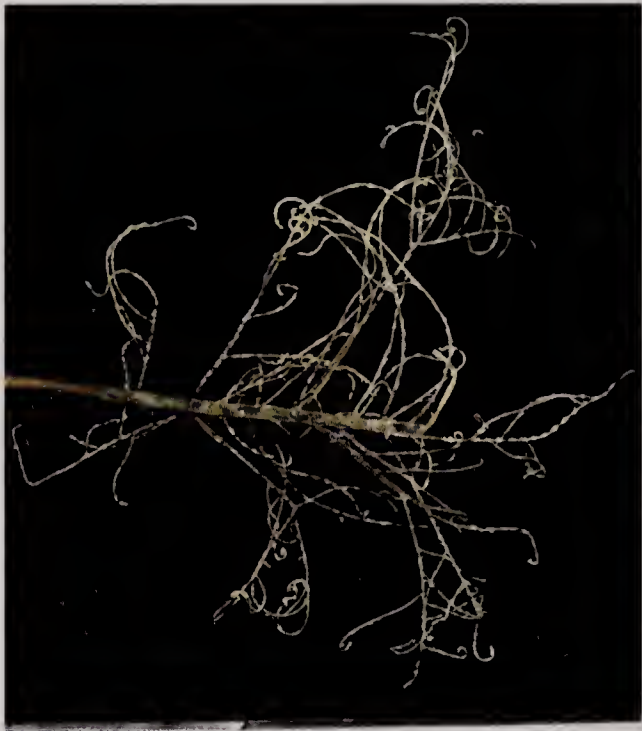


Figure 37.- *Antipathella subpinnata*. General features of the specimen MMC-429.



Figure 38.- *Antipathella subpinnata*. Spines close up. Scale bar 0.1 cm.



Figure 39.- *Antipathella subpinnata* on rocky bottoms from Seco de los Olivos.

Family Antipathidae Ehrenberg, 1834

Stichopathes setacea (Gray, 1860) (Figures 40-42)

Antipathes setacea Gray, 1860: 31.

Stichopathes setacea, Johnson, 1899: 816, fig. 3. Description and remarks. Madeira.

Stichopathes setaea, Brito & Ocaña, 2004: 326-329. Description, ecological data and remarks. Madeira, Canarias and Cape Verde.

Material examined: MMC-428; M045, 04/08/2011, one colony fragment, 158 m, 36°45.1653'N 011°03.5576'W, Submarine mountainins South Portugal: Gorringe bank, Ormonde peak, North Eastern Atlantic.

Remarks: *S. setacea* is well known in Madeira, Canarias and Cape Verde Islands and this is a new record from the submarine mountains located at South Portugal.



Figura 40.- *Stichopathes setacea*. General feature of the colony fragment.

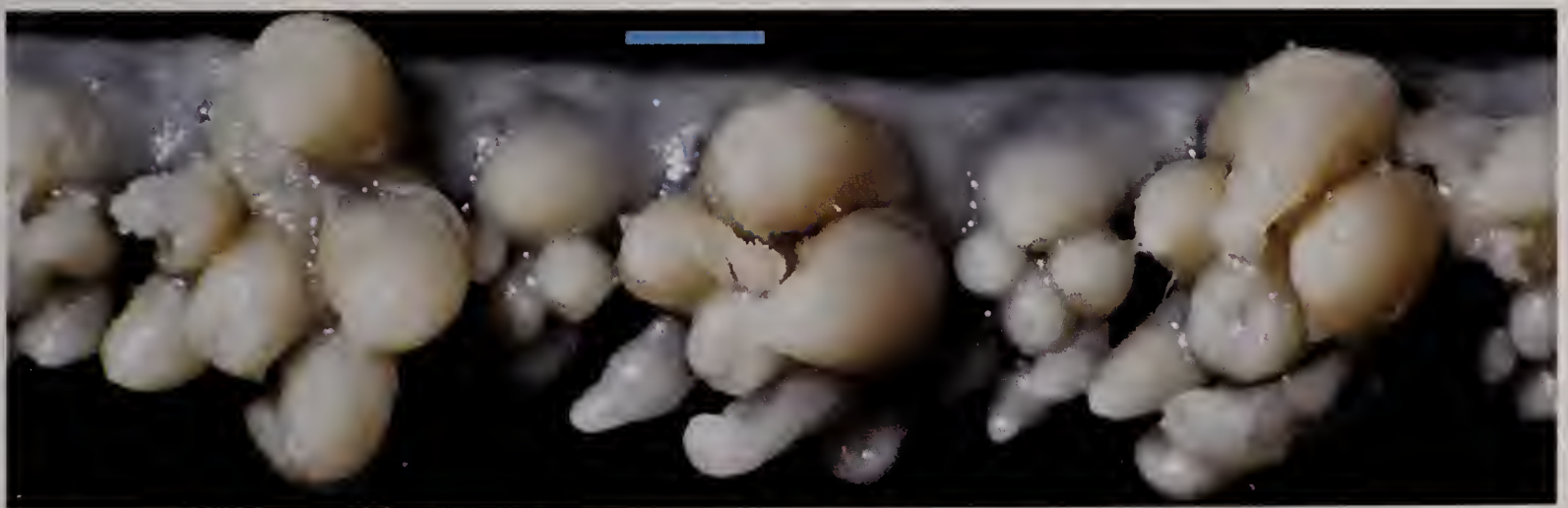


Figure 41.- *Stichopathes setacea*. Close up of the polyps. Scale bar 0.1 cm.



Figure 42.- *Stichopathes setacea*. Spines detail. Scale bar 0.1 cm.

4. ACKNOWLEDGEMENTS

Francisca Serrais was in charge of the general edition and English checking. Paula Millán and Juan Antonio Rosa taking care of the material at the Museo del Mar and Profesor J. J. Bacallado was extremely patient waiting for our draft.

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